Notebook Series -- Notebooks by Experimenters Other Than Edison
Kinetophone and Kinetoscope Experiments -- L. E. Briggs Books
Notebook, N-13-03-18.2

This notebook was used by Leroy E. Briggs during March-May 1913 mainly for experiments relating to the development of Edison's home projecting kinetoscope. The initial entry describes formulas for a silvering solution for plating glass. The remainder of the book is primarily a daily log of Briggs' work on the kinetoscope; the log is continued in N-13-05-22 [not selected]. Included are experiments aimed at adapting the incandescent lamp for use in the home kinetoscope. Other notes describe the work of Briggs and a machinist named Dennis on the development of an adjustable contact apparatus for the kinetoscope. There are also descriptions of new lamp holders and commutators. Some of the entries in the middle of the book contain data on endurance tests for General Electric bulbs that might be used in the kinetoscope. Other experiments involve the use a corrugated aluminum screen, reflectors, and various lens systems. In addition, there are experiments to make the telephone receiver in the kinetophone less bulky and better able to fit into a limited space. A series of entries toward the end of the book describes tests of a frictional microphone for train dispatching. Miller Reese Hutchison directed some of this work, and Briggs produced weekly reports for him. The results of some of the experiments were shown directly to Edison, who commented on them and sometimes gave additional instructions. The notes indicate that Briggs consulted or received instructions and assistance from Ernest J. Berggren, Adolph F. Gall, Zachariah P. Halpin, L. E. Hammond, Absalom M. Kennedy, William H. Meadowcroft, Henry J. S. Rudolf, and Carl H. Wilson. The cover is labeled "Experiments with Lights, and Lenses in Home Kinetoscopes. Also Aluminum Screens. L.E. Briggs I March 18 to May 21, 1913." The book contains 13 numbered pages followed by approximately 95 unnumbered pages.

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96 JOHN ST
AND
19 PLATT ST.
NEW YORK.
54472

L. E. Briggs
Thomas A. Edison
Laboratory
Orange 907 — #175
Book No 1.
March 18, 1913 to May 21, 13

Silver Solution for Coating Glass etc.

1. Washing Solution:

16 Grams Stannous Chloride
1000 c.c. distilled water

The washing solution cleans and prepares the surface to take the silver coating.

2. Silver Solution:

12 Grams silver nitrate
1000 c.c. distilled water
Add strong ammonia; at first, solution turns muddy; add more slowly until solution turns straw color. Allow to stand 24 hours and filter.

3. Reducing Solution.

5 c.c. Formic Aldehyde 40%
250 C.C. Distilled water.

Pour the reducing solution #3 into the silver solution #2 and dip the glass to be plated into mixture as soon as possible.

Tues. March 18.

To adapt incandescent lamps to Home Projecting Kinetoscope:

AM. Took film reel did not wind up so I readjusted.

1. 30 C.P. Edison Mazda Concentrated filament lamps set near the focus of B condenser lens. Screen 15 ft distant Image very dim,

2. Same as above except Screen 10 ft distant Image little better but still poor,

#2909

Tues. March 18

P.M. Ordered silvering solution for silvering incandescent lamp bulbs.
Soldered lead connections etc and connected up.

30 C.P. Marda Lamps.
Concentrated filament
6 Volt.

Battery of 5 Storage Cells.

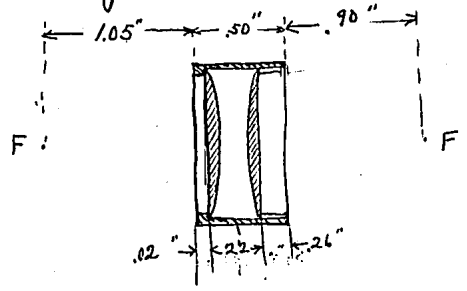
Volts across lamp terminals
light out 6.40 volts.
" on 6.30 volts.
Voltmeter M.45 No 9905

2909 5

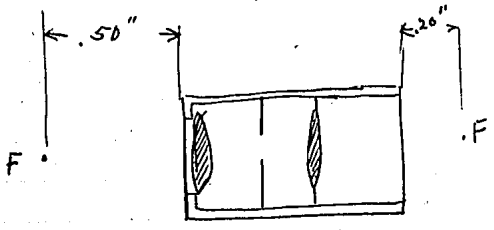
Wed March 19.

Incandescent lighting for Home P.K.

B System lenses



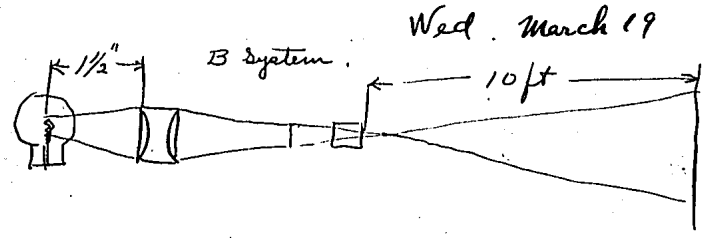
Objective lens.



Above distances between focus and lens barrel was determined by projecting the image of a distant object upon a screen.

2909

Wed. March 19

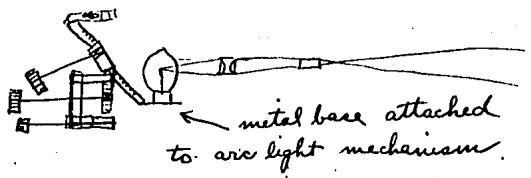


#2909 7

Thurs. March 20'13

Incandescent lighting Home P.K. Machine

AM. Finished the adjustable holder for 30 C.P. lamp.



P.M. Tried film "Pony Express"
Screen 15 feet distant
30 C.P. Concentrated filament Mazda lamp.
Picture fairly good.

Tried film "Mike's Hero"
Picture good — faces pretty good.

The lamp used was plain — not silvered and used without a reflector.

#2909 Thurs March 20, '13
cont'd.

Silvering solution as first mixed had too much ammonia. Solution was perfectly clear and colorless.

Tried a few experiments with small quantities in test tubes to get the straw color. The silver nitrate solution worked best when it had the color of a lab coat.

#

More silver nitrate $AgNO_3$ was added to first solution.

#2909 Fri. March 21, 13

Small tests to determine amount of Formic Aldehyde to Silver Nitrate solution.

Prop.	Formic	$AgNO_3$	
1/4-1	4	16	very dark
1/2-1	8	16	"
3/4-1	9	12	"
1-1	10	10	"
1 1/2-1	15	10	"
2-1	16	8	"
2 1/2-1	15	6	no better
3-1	15	5	"
3 1/2-1	14	4	"
4-1	16	4	little better
5-1	20	4	" "

Results of above experiments are very poor. The Formic Aldehyde seems to be very weak.

#2909 Fri. March 21, 13

Different proportions of Formic Aldehyde was added to Silver Nitrate.

Strengths of formic aldehyde

(1) 3 cc with 120 cc destilled water.
Add (1) to equal quantity of $AgNO_3$
Silver coating was poor.

---

(2) 1 to 50 solution of formic Aldehyde
Add a double quantity of solution (2) to $AgNO_3$.
Result: a heavy coating of metalic silver was deposited on the glass bulb within 10 minutes, but the silver coating began to check and crack almost immediately.

All results of plating were negative.
Mr. Gall said would see me Sat Morning inregard to having General Electric silver the lamp bulbs.

#2909. Sat. March 22, 13

Mr. Gall was not in this morning.

I showed (Mike's Hero) pictures to Mr. Hutchison and he said they were "damn good". He called Mr. Edison who was pleased with the picture and requested us to test the lamps for endurance.

Mr. Hutchison also had Mr. Berggren and Mr. Wilson in to see the pictures. Both thought results were good.

Mr. Hutchison wants me to make an adjustable holder for him.

Make test runs to determine the life of the lamps.

Measure the current used by lamp.

Go to General Electric Works, Harrison to get 12 - 30 CP. 6-V lamps - silvered.

#2909 Sat. March 22, 13.

In the afternoon, I started to make an adjustable holder for the incandescent lamp as requested by Mr. Hutchison.

Stopped work on holder inorder to try the incandescent lamp on day-light picture experiment which Halpin is working on. Pictures looked very good upstairs in the laboratory but when ~~them~~ taken out in the yard, the pictures were very dim.

#2909 Mon. March 24, 13.

Took 7:46 AM train at Brick Church to Newark. Round trip 15¢
Trolley Newark to Harrison, General Electric Edison Lamp works. Round trip 10¢
Return to Lab. 11:58 fare 5¢.

Mr G. H. Stickney and L. C. Porter were not at the works, but Mr. Sommers attended to my order.

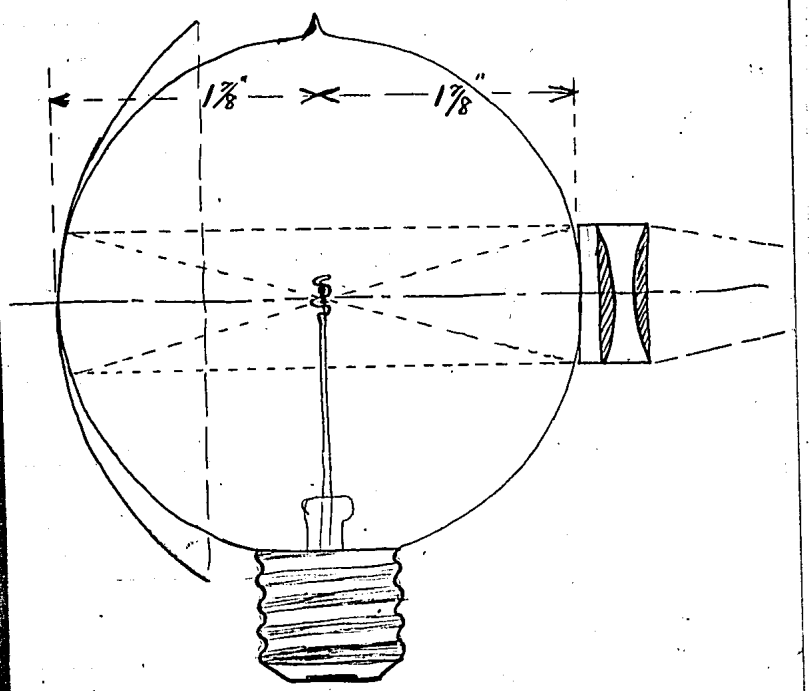
The 30 C.P., 6V - 5 amps; ~~2¼" dia~~ bulb
and 50 C.P., 6V - 10 amps, 3¾" dia bulb

Mazda concentrated helix lamps are not yet on the market; consequently no supply of these lamps are kept in store and all orders are made specially to order.

Their best promise was twelve 30 C.P. lamps — silvered one half vertically. to be shipped by express next Monday March 31, 13.

Mr. Sommers claimed that tests had demonstrated that the life of silvered bulbs was shortened.

#2909 Mon March 24, 13



4" Parabolic reflector 1⅞" focal length.

50 C.P. 6V - 10 amp. Mazda concentrated helix lamp. 3¾" dia of bulb.

4" Parabolic reflector 1 3/16" focal length. to be used with 30 C.P. 6V-5amp lamps.

[15]

#2909 Mon. March 24, 13

Mr. Hutchison advised me to order by telephone.

12 — 50 C.P. 6V - 10 amp.
Mazda concentrated helix filament lamps. ½ Bulb to be silvered vertically.

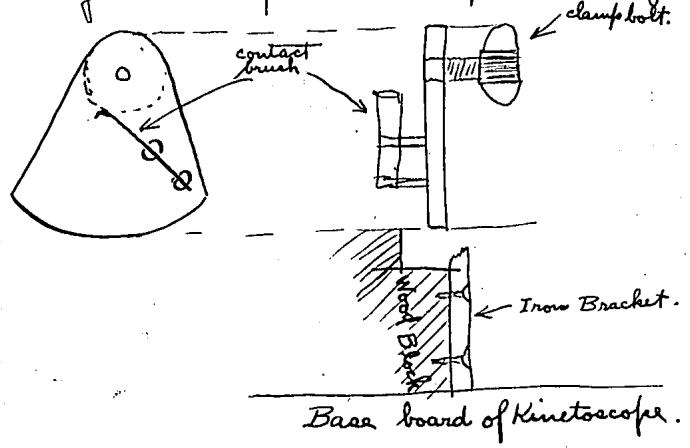
Got Mr. Barns at G.E. works, telephone Harrison 2182.

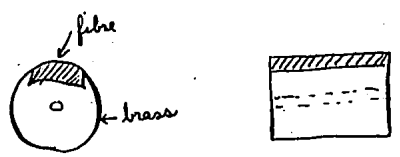
Mr. Hutchison introduced Mr. Dennis as a machinist who would help me make adjustable commutator. This is a contact device made to flash the incandescent lamps at a high voltage while the film is stationary and then contact connection is broken while the film is moving.

#2909

Tues. March 25'13.

Mr. Dennis and I made the adjustable contact apparatus to flash the incandescent lamp at extra voltage when the film is stationary and lamp is out when film is moving.





#2909 Wed. March 26, '13.

Set up Kinetoscope and measured voltage and amperes at lamp.

6 storage cells gave 8.2 volts across their terminals. After current passed through commutator, the voltage across lamp was

6 cells 5.7 volts. and 5.3 amp.

8 storage cells : readings at lamp.

8 cells 7.3 volts 6.1 amp.

normal voltage of lamp 6 volts.

Commutator adjusted to cut out the current 1/4 of the time. - Current flows during 3/4 of total time.

Good motion pictures

28" x 38"

15 feet distance

B system lenses.

#2909 Wed March 26, 13.

—: Commutation action :—

The commutator is fastened on the flywheel shaft which makes one revolution to each picture.

By actual measurement, the motion of the film required to make one complete change of picture occured while the fly wheel turned through 1/12 of a revolution — the film remaining stationary during remainding 11/12 of the revolution.

Hence if the electric current is broken only while the film is moving, the incandescent lamp will burn at a very intense heat 11/12 of entire time — thus allowing only about 1/12 of the time to cool off.

The commutator was made with 1/4 of its circumference of fibre — thus making it possible to cool the lamp filament during 1/4 of entire time. By use of a double brush arrangement, this time interval may be shortened any amount desirable — the lamp may even be kept burning without any pause at all.

#2909 Wed. March 26, 13.

Experiment in small dark room.
C System lenses.
30 C.P. lamp ½ silvered vertically
9 storage cells, 8.3 Volts - 6.3 amps
Good picture 36"x48"
Mr. Edison thought it good,

Experiment continued in Committee Room.
9 storage cells same as before.
B System lenses
Good picture 54" x 72" (full size of screen)

Attempt to cover large screen
11 storage cells
C System lenses.
Lamp burnt out — filament did not break but filament lead melted.

Mr. Hutchison authorized an verbal order to have G. E. Co. make two large lamps of concentrated helix type. These will be used to experiment with incandescent lighting of the large Kinetoscope.

#2909 Thurs. March 27, 13

Submitted the weekly report to Mr. Hutchison.

New improvements in the lamp holder and commutator are started worder to have the complete apparatus in fine working order for demonstrations when the new lamps arrive.

Called Mr. L. G. Porter of the G. E. Lamp Works at Harrison, on the telephone, inregard to special lamps of high candlepower to be tried in the large Kinetoscope.

Lamps of the concentrated helix type are not made in sizes greater than 50 C.P. because a wire carrying more than 10 amperes can not be properly sealed in glass.

Mr. Porter says that their tests showed the silver coating on the bulb increased the candlepower very little while the life was shortened by the reflected rays being assorbed by the filament.

[27]

#2909 Thurs. March 27, 13.

Mr. Porter said that the G. E. Co. is making some special lamps of very high concentration for us. He thought that the first experimental lamps:

[110 volts 120 C.P. with a long bulb — but not a large dia.

was finished and tested.

Mr. Jackson of the experimental dept could not be found but Mr. Porter promised to give our order his special attention and to rush as much as possible.

#2909 Friday March 28, 13

Made a new lamp socket and holder.
Started on changes in commutator.

C315

#2909 Sat. March 29, 13.

New lamp holder and commutator finished today, and connections and adjustments made.

Complete apparatus is ready for demonstration with the new lamps.

#2909 Mon. March 31, 13.

Home P.K. trials on the large size screen.

C system lenses
30 c.p. concentrated helix lamp.
not silvered.
Current broken during 1/4 of time.
7 volts (normal is 6 volts)
Very large picture on commercial size screen was dim but pictures on aluminium screen were good.
Mr. Gall saw pictures on both screens.

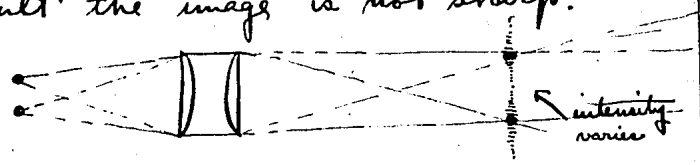
Mr. Mc Cracken of General Electric Works telephoned the earliest shipping dates:

30 c.p. 6 V - 5 amp — 12 lamps April 7.
50 c.p. 6 V - 10 amp — 12 " April 5

#2909 Tues. April 1'13.

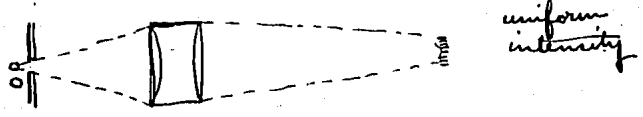
Experiments with the Nernst lamps in the Home Kinetoscope:

The two incandescent bars are two separate light sources. The rays of two sources do not come to the same focus on the screen. As a result the image is not sharp.



If the light source is a point, all the light rays come to the same focus and the image is sharp.

If all light rays except those from one point are cut off by means of an aperture, the image on the screen becomes much sharper



#2909 Wed. April 2, 13.

Experiments with the Nernst lamp in the Home Kinetoscope.

Experiments were tried with an aperture about 1/8" dia infront of one of the incandescent bars of a Nernst lamp. When the aperture was used, the moving pictures appeared to be in sharper focus than when the picture was illuminated from both of the incandescent bars. A new aperture plate, the design of which could be used in commercial manufacture, was started.

Question: Is a picture produced by light rays, each ray in a definite direction, projected through the film, or do the light rays strike the film which then becomes a light source due to the diffusion of the infringing light rays?

This can be settled by varying the distance between the light source and the condenser lense. If the sharpness of the picture is not disturbed thereby, the picture is due to diffused light.

#2909 Thurs. April 3, '13

I spent most of today charging titles in the Scenario "Magnetism." This scenario was corrected by Mr. Meadowcroft. We went over the suggested changes and now I have the scenario ready to submit to Mr. Edison.

The aperture for the Nernst lamp was finished but not early enough to permit extended trials.

C41J

#2909 Fri. April 4, '13.

Experiment: effect of an aperture 1/8" dia. in front of a Nernst lamp.

Two Home Kinetoscopes lighted with Nernst lamps were used simultaneously to give a clear comparison.

Two films "Mike's Hero" were used.

One Kinetoscope had a Nernst lamp without any obstruction between it and the condenser lens; The other machine, exactly the same as the first, had the aperture 1/8" dia directly infront of the lamp, thus allowing the light from a small part of only one incandescent bar to reach the condenser lens.

The pictures thrown upon the screen, side by side, each about 24 inches long, were easily compared.

The picture from the machine using the aperture was the better

#2909 Fri. April 4, '13.

The use of the aperture gives the picture the appearance of much greater depth and sharper focus.

Picture lighted by the regular Nernst lamps was very poor when compared to the picture lighted by the Nernst lamp with an aperture.

Mr. Hutchison and Mr. Gall saw the pictures and both said that pictures from the machine using the aperture were very much better. Neither knew how the lamps were connected up until after they had expressed their opinions

#2909 Sat. April 5, '13.

Submitted Scenario "Magnetism", revised as per corrections by Mr. Meadowcroft, and a typewritten suggestion for Ed. Film Title Slides to Mr. Hutchison.

Tried to readjust the copper brushes on the Home Kinetoscope. The copper brushes rubbing on the copper commutator are giving trouble.

Carbon brushes may be necessary to eliminate the trouble.

#2909 Mon. April 7, 13.

Made a new brush holder for H.P.K machine. Copper brushes did not work well on the copper commutator.

The new carbon brushes work very good.

I called Mr. Mc. Cracken of the G.E. Co. at Harrison. He said the 50 C.P. and 30 C.P. lamps could not be shipped April 5, & 7 as promised but the 30 C.P. lamps will surely be shipped on the 8th., and the 50 C.P. lamps on the 10th.

#2909 Tuesday April 8

Made a special attachment to the arc light mechanism to try a diaphragm between the arc and the condenser.

The diaphragm was 1/8" dia and was supported about 3/8" to 1/2" away from the arc inorder to escape the intense heat. The experiment showed, however, that the diaphragm was too far away from the arc — either the diaphragm must be closer to the arc, or the diaphragm must be longer.

This experiment was interrupted for the present inorder to test the new incandescent lamps which are expected tomorrow.

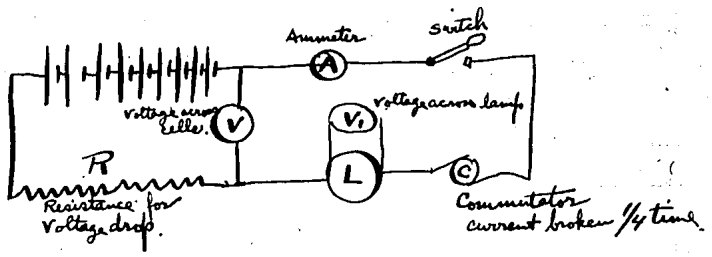
#2909 Wed. April 9, 13.

Home Kinetoscope was connected with electric drive:

The flywheel was turned to a V groove and driven directly by belt from an Emerson 1-20 D.C. motor. A small variable resistance in series with the shunt field permits the adjustment of the motor speed.

The complete outfit, kinetoscope, motor, resistance, double throw switch and wire connections for both the motor and the incandescent lamps are mounted upon one base board.

The complete apparatus runs well and endurance runs will be made with the new incandescent lamps.



#2909 Thurs. April 10, 13

Endurance tests of Concentrated helix lamps.

Lamp #1. — 9 storage cells.

Regulation speed — 16 pictures per sec.

Time	Volts at Lamp.	Volts at Battery	Amperes	Quality of Picture	
4:00 PM	4.1	10.7	4.5	good	24"×36"

Burnt out after 45 minutes.?

Helix was exactly in center of bulb but silvering was a little dirty.

This test is doubtful — should be discarded

Friday 4-11, 13

Lamp #2 — 9 storage cells.

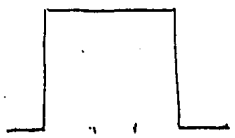
16 pictures per sec.

Helix and its image coincide [illegible]

10:45–11:15	to 4.	9.1	4.5	OK –	24"×36"
2:00 – 2:20	4.0	9.0	4.4	OK –	24"×36"
2:30	4.1	9.0	4.5	OK	"
3:	3.9	9.0	4.3	good	"
3:30	3.8	9.0	4.3	good	"
4:00	3.9	9.0	4.3	"	"
4:30	3.9	8.8	4.3	"	"
5:00	3.7	8.8	4.2	"	"
5:30	3.8	8.9	4.3	"	"

no perceptible blackening of lamp bulb.

4 hours run.



#2909 Sat. Apr. 12, 13

Lamp #2 cont'd.

Time	Volts at Lamp.	Volts at Battery	Amperes	Quality of Picture.
8:00	4.3	9.3	4.8	good - 36 x 24
8:30	4.2	9.4	4.7	" "
9:00.	4.2	9.3	4.7	" "
9:30	3.8	9.4	4.5	Drop at lamp due to heating of commutator.
10:00	3.9	9.4	4.6	
10:30	4.8	9.4	4.5	

Continued:

2½ hours

The voltage (average) 4.+ is nearly equivalent to normal voltage.

Carbon brushes are increased from ¼" dia to ½" dia.

#2909 Mon April 14, 18

Lamp #2 cont'd.

Time	Volts at Lamp	Volts at Battery	Amperes	Quality of Picture
9:00	5.8	10.4	5.9	good 24×36
10:00	5.9	10.5	6.3	" "
	Lamp became very black at end of 1 hour run.			
	5.6	8.8	6.0	Commutator
	6.9	8.2	6.9	" cut out.
	Lamp # 3			
	Helix a little out of center of bulb.			
3:00	5.6	8.9	5.8	good 24×36
3.30	5.6	8.9	5.7	" "
4.00	5.7	8.7	5.7	
4.30	5.7	8.7	5.7	lamp begins to blacken. Picture OK.
	1½ hours			

Arc #2909 — Mon Night Apr. 14, 13

Lamp # 4

Helix is central — silver dirty. 5 cells.

Normal voltage — constant current.

PM	Volts at lamp.	Amperes	Picture
8.20	6.1	5.8	good 24 x 36
9.00	5.9	5.7	" " "
9.30	6.0	5.7	" " "
10.00	6.0	5.7	
10:30	6.1	5.7	

2 hours 10 min (no intermission)

night. 9 30 Mon 10:30 PM to Tues 8:00 AM

Lamp # 4 cont'd — Tues. Apr 15

8.00 AM	5.8	5.7	
10.00 "	6.0	5.7	Resistance adjusted to restore normal voltage.
11.00	6.0	5.7	
12:00	6.1	5.8	Instrumentator off one lead.
2:00	6.0	5.7	
5.00	6.0	5.7	

9 hours day run Tuesday

2 " 10 min

9 " 30 " (no intermission)

20 hrs 40 min

night 15 hrs 0 " Tues. 5.00 PM to Wed 8 AM.

35 hrs 40 min Total

C613

2909

Wed April 16

Lamp #4 cont'd

Time	Volts at Lamp	Volts at cells	Amperes.	
8:00 AM	5.9		5.6	Put on 6 cells with resistance in series and restored normal voltage.
11:00	6.1		5.7	bulb becoming black.
12:00	6.0		5.6	
3:00	6.1		5.6	Picture 24"x36" good.
4:00	6.1		5.6	
5:30	6.1		5.6	
	9 hrs	30 min	run Wed.	
	3.5 "	40 "		
	45 hrs	10 min.		

April 17, 13 8-9 AM

Watched with Gall, Hammond and Kennedy the method of taking a record, and apparatus of a diaphragm governor,

#2909 Lamp #4 Thurs Apr. 17, 13.

Time	Volts at Lamp		Amperes	
8:00 AM	6.0		5.7	bulb.
10:00	6.0		5.6	
11.00	6.0		5.7	
12:00	6.0		5.6	
Friday 5:30 PM	6.1			
Sat 8.00	−5.0			

48 hours
45. ~~30~~ 10 Total
93.

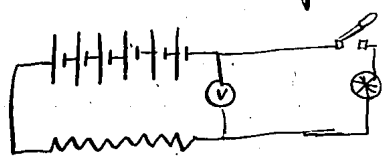
Mr. Hutchison, Mr. Gall, Mr. Wilson and others saw the pictures in the committee room.

50 CP -- 6 volt 10.5 amp lamps. gave a yellow light and was not as good as the 30 CP. 6-V - 5.7 amp.

C153

#2909 Friday April 18 '13

Home Kinetoscope was set up in the Committee room. Incandescent lamp connected to 6 – 4-6 storage cells in series with an adjustable resistance.



Voltage was adjusted to 6.5 volts;

#E 30 C.P. lamp, silvered ½ vertically was tried first.

#F A 30 C.P. lamp, plain bulb was next

#G 50 C.P. lamp, plain bulb, last.

Plain bulbs gave better results than bulbs silvered ½ vertically.

50 C.P. was litter better than the 30 C.P. but 50 C.P. had a little color rim because large bulb kept filament away

#2909 Fri. April 18, 13

from condenser, the light spot not quite covering the picture.

Cie Gle De Phonographes
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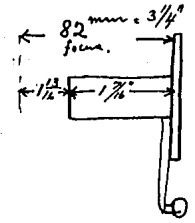
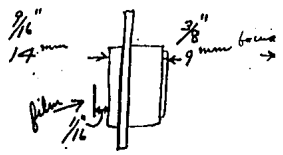
Breveté S.C.D.C.

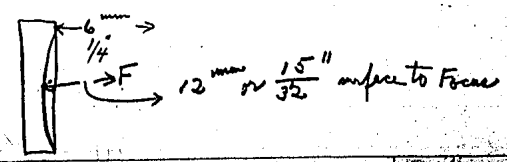
Objective



Condenser



Mirror

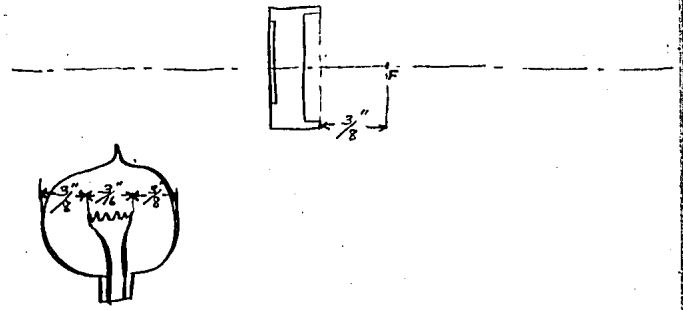


Extra White Aluminum GH.

German-American
Bronze Powder Mfg Co
80 Warren St NY.

#2909

Fri. April 18, '13.



C(1)

#2909 Sat. April 19, 13.

Mr. Hutchison has returned from Washington.

I told him of the results from a plain bulb compared with that from silvered bulbs. He was too busy to see the pictures but he told me to take a machine and equipment to the G. E. Co in order to have photometric tests made.

Measurements taken of the lens system and reflector on the French Home machine together with a few calculations revealed the interesting facts that although this machine uses a spherical reflector, the lamp was placed in a position such that the image was superimposed upon its filament, — exactly the same principle we are using in silvered bulbs

#2909 Mon April 21, 13

Took the 8 oclock train for Newark and trolley to Harrison.

Mr. Porter had a committee meeting in the morning. Mr. Muller showed me through the lamp works and the lamp tests were made in the afternoon.

Mr. L. C Porter, Mr. Sommers and conducted the photometric tests and finished at 5 PM.

#2909 Tues. April 22, 13.

Mr. Gall saw me Saturday about making experiments with aluminium screens for the Home P.K. A corrugated cloth is to be tried inorder to increase the angle of view.

Mr. Edison wants Gall to try a spherical reflector with the arc light in large Kinetoscopes. Quartz is suggested as the best material.

An aperture 1/8" dia is placed infront of the arc in the Home P.K. I want to try this experiment inorder to see if the picture is sharper — this was found to be the case when an aperture was used before the Nernst Lamp.

#2909 Wed. April 23, 13.

H.T.K. Screens – Corrugated cloth.

Aluminium carriers:

1) Water Proof Llopq (Jamison)
Amyl-Acetate for thinning.

2) Barium Sulphate & Gelatine.
Grind to fine powder
Add a little Chrom alum just before use.

3) White glue & water.

4. Zinc white, white glue & water

5. White lead, turpentine
apply with brush.
Polish with silicate of magnesia.

#2909 Thurs Apr. 24, 13.

30 C.P. Concentrated helix

6.0 Volts – 5.5 amperes,
6.5 " 5.7 "

50 C.P. concentrated helix

6.0 volts. 10.7 amperes.
6.5 volts. 11.2 amperes.

Aperature 3/16" dia. front of arc light in H.P.K. did not improve the pictures. Two machines were tested side by side.

My aluminium covered screen with vertical corrugations has a wide "angle" but its illumination in front can be improved. The illuminium coate is a little thin because day light can diffuse through it in places.

C8[illegible]

1909 Fri. April 25, 13.

A representative of the Army was here today inorder to study the Home P. K., Halftin and I gave an exhibition with both the incandescent lamps and the arc light in Ramsay's room.

Afterwards, we went to the film plant inorder to show some large films.

Saturday.

at Westerly R.I.

#2909 Mon. 28, 13

Mr. Hutchison wanted a new 30CP lamp Sunday but could'nt find it. He advised me to order 2 doz new lamps, using heavier copper leads and larger bulb.

I talked with Mr. Bettchner and he said he would use a heavier lead and G 25 bulb. He requested that I send him the lamps which have failed. 3 lamps and a letter were sent this afternoon.

Mr. Hutchison called the Cuttler-Hammer Transformer people on the telephone, and their representative came up late in the afternoon.

I started to put aluminium power on screen painted with Varnish.

(85)

#2909 Tues. April 29/13.

~~Painted~~ Varnished the corrugated aluminium screen. While the varnish was still sticky, aluminium power was sprinkled upon it and then it was gone over with a felt covered roller.

This screen gave very good results at a trial in the committee room.

Mr. Marshall, production clerk, has made the Aluminum Screens.

#2909 Wed. April 30, '13.

Lamps tested at G. E. Works:

Lamp #1. 30 c.p. Plain bulb.
Filament good shape – bulb clear.
H. d – intact.

Lamp #2 30 c.p. Silvered.
Filament shape OK but not central.
Image displaced ½ dia of helix to the right.
H. d – on one lead broken.

Lamp #3. 50 c.p. plain bulb.
filament helix is tipped about 15° with both the vertical and horizontal axis. Bulb clear – H.d. broken off both leads.

Lamp #4 50 c.p. Silvered bulb.
Image of filament is directly above the filament helix.
Filament is a better helix than the filament of lamp #3.
H.d broken from both leads.

#2909 Wed. April 30, '13.

Most of today was spent on writing reports and calculation.

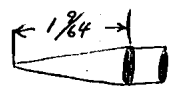
Mr. Hutchison requested me to find what a Sharpe-Miller Photometer costs. I called up the Newark ~~Co~~ Electrical Supply Co and they promised to look it up.

Mr. Edison approve the order of a Sharpe-Miller Photometer - May 9, 13.

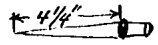
#2909 Thurs. May 1, '13.

Back Focus
measured to lens surface.

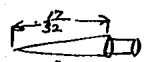
A Motion Picture



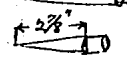
A. Stereoptican



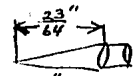
B Motion Picture



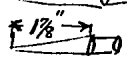
B Stereoptican



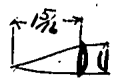
C Motion Picture



C Stereoptican

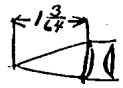


A Condenser



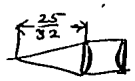
41° 40'

B Condenser 43°



51° – 0

C Condenser



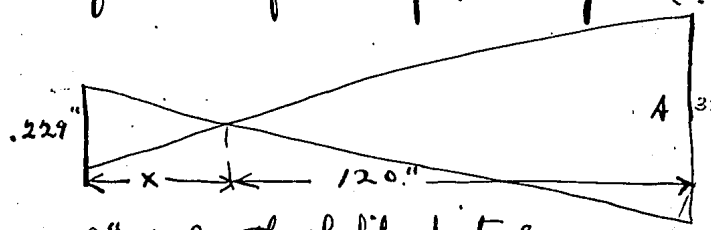
65° 10'

Mr. Gall saw the corrugated screen today. He thought it good and advised me to experiment with different materials for the screen.

I ordered 1 pound of aluminum powder. Received same from Reis May 6, 13.

#2909 Fri. May 2, 13.

Equivalent focus of ABC objective:



.229" is length of film picture
A is length of projected picture.
X is focal length of objective

A =	32	for C objective
A =	24	" B "
A =	16	" A "

.229 : X :: 32 : 120 for C X = .859"

.229 : X :: 24 : 120 for B X = 1.145"

.229 : X :: 16 : 120 for A X = 1.718"

Stereoptican lenses are 3 times the focus of the motion picture objective.

#2909 Fri. May 2, '13.

"Angle" of 3 objective lens.

$\tan C = \frac{16}{120} = .1333$ 2angle C = 15° - 12'

$\tan B = \frac{12}{120} = .1000$ 2angle B = 11° - 26'

$\tan A = \frac{8}{120} = .0666$ 2angle A 7° 38'

#2909 Sat. May 4, 13.

This morning was spent upon the design of a reflecter and a suitable mounting to support the reflecter and incandescent lamp.

The necessary specifications for such a mounting with the required adjustments is covered by the typewritten notes.

#2909 Mon. May 5, 13.

Spent the afternoon in N.Y.C. — Unable to find a spherical mirror.

Places which I visited.

Bausch & Lomb Optical Co.
200 — 5th Av. N.Y.C.

E. B. Meyrowitz
125 W 42d Street.

E. B. Meyrowitz
237 5th Ave.

E. B. Meyrowitz
170 Bway.

Herbert & Huesgen
311 Madison Ave.

The only reflectors they carried were parts of instruments.

#2909 Mon. May 5, 13.

Experiments with lens systems:

Using C objective.

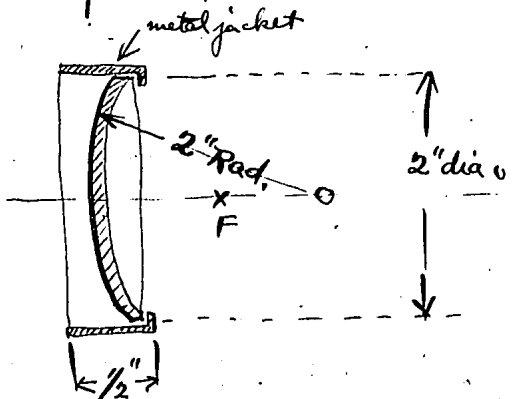
I. try C. condenser
II. " B "
III. " A "

Since A condenser has a smaller angle and the source of light is further from condenser, this combination should give a picture which is not illuminated as well as the picture in test I.

A small difference could be detected with the eye, but a photometer should be used inorder to get complete and definite data.

1913 #2909 Tues. May 6, 13

Ordered this morning from
Bausch & Lomb Optical Co.
Rochester, N.Y.
One (1) Spherical mirror Reflecter.
Curvature 2" radius (having a
focus of 1")
Aperture 60° or 2" dia opening.



Please mount glass reflecter in a cylindrical metal jacket. This will have a sliding fit in a sleeve which we shall make.

PLEASE RUSH.

[105]

#2909 Tues. May 6, 13.

Called Mr. Bettchner at G. E.
Harrison 2,882
He promised to push the order as rapidly as possible.

#3363
~~# 2204~~ Tues. May 6, 13

Received today from Mr. Holland.

One Western Electric Company 228 W Transmitter.

One receiver -

proper current .14 to .3 amperes.

3363 Wed. May 7, 13.

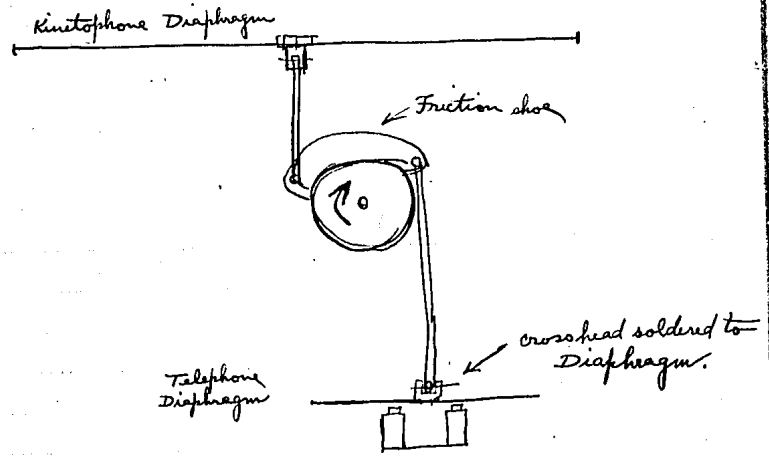
Webb. Microphone Philadelphia
used with Phonograph Records.
Mr. Gall says this is good.

Frictional Microphone for
Train dispatching.
Lab. S.O #3363 per G.G.M.

Received from Mr. Holland. one
Am. Bell Tel. Co Induction coil.

CIII-J.

#3363 Wed. May 7, 13.



A thiner cap for the telephone receiver is being made because the hard rubber one is too bulky to fit in the limited space on the Kinetophone apperatus.

A crosshead was soldered to the receiver diaphragm. At the last minute, just for a very preliminary test, the receiver (diaphragm connected by link to friction shoe) was held in the hand while another fellow spoke into the transmitter. Promising

#3363 Thurs. May 8, 13.

Finished the aluminum cap for telephone receiver and the mounting to support the receiver is well along.

Visit to G. E. Lamp Works.

Mr. L. C. Porter
Illuminating Engineering.

Mr. Bunnell
Automobile Sales Dept.

Mr. Jackson,
Ch. Eng. Experimental Dept.

Mr. Bettcher
Engineering Dept.

Mr. Mc Cracken
Order Dept.

Mr. Rogers for Procurement Dept.

#3363

Thurs
~~Fri~~. May 8, 15.

Mr. Porter recommended the ~~Foote Pierson~~ Sharpe-Millar Photometer as the only photometer to be considered seriously.

The Foote Pierson Co
160 Lenane St N.Y.C.
Tel Worthe 1520
carry this instrument in stock
Cost $125.00.

The Western Electric Company also advises that O. T. Louis
70 - 5th av. N.Y.C.
handle the entire line of scientific instruments.

Mr. Porter says that our 30 CP. 6V 6A are called Concentric Helix. — not Concentrated Helix

3363 Thurs. May 8, 13

Mr. Jackson Ch. Engr of Experimental Dept. promises a new 110 volt incandescent lamp of high concentration very soon.

A very efficient lamp

Concentration within a cylinder $\frac{5}{16}$" dia and $\frac{5}{16}$" length.

1000 hours life

250 Candle Power.

He expects to bring over 50 complete lamps soon.

3363 Fri. May 9, 13.

I saw Mr. Hutchison this morning inregard to Incandescent Lamps, receptacles, and also about the Train Dispatcher experiments.

Mr. Hutchison had a talk over the telephone with Mr Jackson. Mr. Hutchison wants a 40 or 50 volt lamps immediately. He also requested that we have one of the 110 volt lamps inorder to test it in the Home P.K.

Mr. Hutchison dictated a long and comprehensive letter to Mr Burrows, head of G. E. Lamps works, inregard to our urgent need of incandescent lamps for large commercial and also Home P.K motion picture machines.

CRIJ

.E #3363. Fri. May 9, 13.

Test of Frictional Microphone for Train Despatching:

With one tray of storage cells (6) about 7 volts — without induction coil: Words from horn lack volume.

Induction coil was added but with little improvement

Another tray of 6 cells was added in series with the first tray: A little increase of volume was obtained but the results were not very promising.

#3363 Sat. May 10, 13.

Mr. Holland invited me to hear his loud speaking receiver which he has set up in the Electrical Dept. This outfit does not use the induction coil but it is fairly loud and distinct.

Mr. Holland and Mr. Hutchison listened to my microphone while I spoke into the transmitter. Transmitter was on Mr. House's desk and the microphone was out in the hall.

Mr. Holland promised to make a special transmitter and receiver about Tuesday.

#2209 Mon. May 13.

Wrote notes on use of Sharpe-Millar Photometer.

Connected up the transformer to 6 V. 30 CP. lamps.
The primary is designed for 110 V but our line voltage is over 120.
I borrowed an AC Voltmeter, 120 Volt scale, from Hutch's office, but voltmeter is not large enough. Put a Home P.K. Resistance Coil in series and the voltage dropped to 85 Volts.

Mr. Gall called Farrel of the Kenetophone Dept on the telephone inorder to borrow a 220 AC voltmeter.

C# #2909 Tues. May 13, 13

Mr. Marshall who has made aluminum screens came up this morning. I wanted to get the sizes of screens made and the width of rolls used.

27"x 36" screen	58" roll.
40½ x 54	60" roll
54 x 72	60" roll.

Marshall says he has about 300 screens in stock.

#2909 Tues. May 13, 13.

Tested the Cutler-Hammer transformer 110 volt primary and 6 volt secondary.

Line voltage 110 - 60 cycle.

When the primary is connected to the line, the 25 ampere fuses blow.

A second transformer was used in series with the circuit and the voltage was thereby reduced to 38 volts. Even at this voltage at the primary the small transformer becomes dangerously hot in a few seconds.

Mr. Gall told me to call Mr Slate, Cutler-Hammer - Courtland 8445 50 Church St N.Y.C.

Mr. Slate was not there but Mr. Montgomery promised to have Mr Slate see Mr. Gall.

C131

3363. Wed. May 14, 13.

Material for Home P.K. Aluminum Screens:

The following size screens have been made and about 300 are now in stock:

Size Screen	Width Roll.
27"x36"	58"
40½"x54"	60"
54"x72	60"

14 different manufacturers of cloth or imitation leather were requested by letter to submit prices and samples of their goods which had a vertical rifle or corrugation similar to an enclosed sample from us.

None of the manufacturers who replied could furnish material in rolls 60" wide but many could supply us with widths up to 54".

A few samples of aluminum screens were submitted as follows:

#3363 Wed. May 14, 13.

54# aluminum	60¢ per running yd.
40 " "	33¢ " " "
38" rifle ~~plaster~~	16½¢ " " "

Mr. Gall has a new B condenser from Bausch & Lomb. This is a special lens made from better glass. Mr. Gall wants me to test this lens and to compare it with the old B. condenser.

Telfaire gave me the loudtalking transmitter and receiver this afternoon.

As first set up - ~~western~~ transmitter with loud sounding receiver, a rattling sound was heard. This was due to the grating of particles in the carbon transmitter. A special transmitter did not have this sound but the sounds lacked volume.

#3363. Thurs. May 15, '13.

Sent in weekly report.

A new transmitter was tested this morning. The first tests were failures because the receiver was not properly polarized with the line and the receiver became demagnetized. After the receiver was remagnetized, it was again tested but the sounds lacked volume.

Mr. Holland decided to try another transmitter because this experiment seems to be a problem in receivers and transmitters. After the proper transmitter and received are found the matter of a good friction device is easy.

Mr. Hutchison sent up Mr. Jackson's letter in regard to 110 volt experimental lamps and I got busy inorder to fit up two machines, one with the 6 volt lamp and the other with the 110 volt lamp.

Thursday May 15

Since the condenser lens is only 3½ inches above the lamp-house floor, and since the new 110 volt lamp is 4½" from base to filament, it was necessary to cut a hole through the lamp house floor and also through the sliding board. This was sufficient to bring the filament at the center of the condenser and also enough to allow a slight vertical adjustment. The hole is not large enough to allow horizontal adjustment for A and B system dimmer but this hole can be enlarged latter.

Mr. Hutchison advised me by memo that a representative from the G.E. company would call tomorrow with the Sharpe-Millar Photometer.

#2909 Fri. May 16, 13.

I connected up the two Home machines in the show room, third floor back, laboratory. An adjustable rheostat was put in series with the line in order to reduce the voltage from 125 to 110 which is normal voltage for the new lamps.

Mr Jackson was present at our tests and he remained until noon.

A C system lens system was used and the picture was projected upon the ordinary porous "Talking Picture screen." "Swearing off smoking" was the film, which has some very dark scenes in it, especially where the victim leaves the dining room after he is tortured by the sight & smell of his friend's cool, fragrant, after luncheon cigar.

This scene was showed to

C141

#2909 Fri. May 16, 13

Mr. Edison, both from the machine using the 6 volt lamps and again from the machine using the 110 volt lamps.

The machine was then carried to the back of the room until a very large picture was thrown upon the screen, using the C system lenses.

Mr. Edison was greatly pleased with the results and he said. give the business to the G. E. Co. and they in turn would have to buy his storage batteries.

Mr. Edison was particularly pleased because of the prospects of doing away with the arc light.

#2909. Fri. May 16, 13

Mr. Summers of G. E. Co, Illuminating Engineering Dept, called with his Sharp Miller Photometer. He explained the method of using this instrument and gave me the proper constants. For accurate results, the instrument should be frequently calibrated. New standard lamps can be ordered through the G.E.Co and of course, the photometer must be recalibrated whenever a change of standard lamps is made.

Constants:

242 Mil. Amps should be put through the standard lamps by means of a few batteries.

Elbow Side

Dark screen – divide reading by .038
Light screen – " " " .214

Standard Side

Dark screen – multiply reading by .038
Light screen " " " .214

1 Sat. May 17, 13.

Mr. Holland is working on a new transmitter. The last one had good volume but the sounds had a very pronounced "horn effect". The new transmitter with which Mr. Holland hopes to correct the above defect, will be ready Monday.

Set up the Sharpe Millar Photometer under to try it out.

C1472

#2909 Mon May 19, 13

Test of new B" condenser from Bausch and Lomb.

Picture 27" x 36"

Photometer at center of picture

Commercial B condenser

1	3.3
2	3.2
3	3.0
4	3.2
5	3.0
6	3.2

18.9 average 3.15

Park screen on standard side.

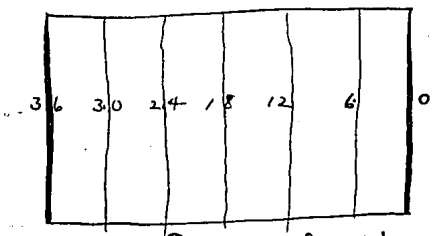
Special B condenser.

1	3.2
2	3.2
3	3.1
4	3.1
5	3.2
6	3.2

6 | 19.0

3.16

2909 Mon. May 19'13



Special Con.
Barnes & Lomb.

Screen Section O

Photometer screen Dark Standard Side

1	3.8
2	3.8
3	3.8
4	3.9
5	3.9
6	3.8

6 | 23.0
3.83 × .038 = .146 Ft. cd.

Screen Section 6

Photo Screen | Dark Standard Side

1	4.4	3.7
2	4.2	3.6
3	4.3	3.7
4	4.4	3.6
5	4.0	3.8
6	4.3	3.8

6 | 22.7
3.78 × .038 = .141 Ft Cd.

(51)

2909 Mon. May 19, 13

Screen Section 12

Photo	Screen	Dark	Standard Size
1	3.8		
2	3.8		
3	3.7		
4	3.9		
5	3.9		
6	3.9		

6 | 23.0
3.83 × .038 = .146 Ft. Cd.

Screen Section 18

Photo	Screen	Dark	Standard Size
1	3.8		
2	3.8		
3	3.7		
4	4.0		
5	4.0		
6	4.0		

6 | 23.3
3.88 × .038 = .147 Ft. Cd.

10 2909 Monday May 19, 13

Screen Section 24

Photo	screen Dark Standard Side
1	4.0
2	3.6
3	3.6
4	3.6
5	3.5
6	3.6

$6\overline{)21.9}$ $3.65 \times .080 = .139$ Ft Cd.

Screen Section 30

Photo	screen Dark Standard
1	3.6
2	3.6
3	3.7
4	3.5
5	3.6
6	3.7

$6\overline{)21.7}$ $3.63 \times .080 = .138$ Ft.Cd.

#2909 Mon May 19, 13.

Screen Section 36

Photo Screen Dark Standard.

1	3.7
2	3.5
3	3.6
4	3.6
5	3.6
6	3.5

6)21.5

3.58 x .038 = .136 Fld.

2909 Mon. May 19, 13.

Stock B. Condenser

Screen Section. 0

Photo	Screen	Dark Standard
1	3.5	
2	3.3	
3	3.3	
4	3.2	
5	3.3	
6	3.3	

$6\overline{)20.9}$ $3.48 \times .080 = .132$ Ft Cd.

Screen Section 6

Photo	screen	Dark Standard
1	3.5	
2	3.5	
3	3.5	
4	3.6	
5	3.5	
6	3.5	

$6\overline{)21.1}$ $3.51 \times .080 = .133$ Ft Cd.

#2909 Mon. May 19, 13.

Screen Section 12

Photo	Screen	Dark Standard
1	3.5	
2	3.4	
3	3.5	
4	3.4	
5	3.5	
6	3.4	

$6\overline{)20.7}$ $3.45 \times .038 = .131$ Ft. Cd.

Screen Section 18

Photo	Screen	Dark Standard
1	3.3	
2	3.4	
3	3.4	
4	3.3	
5	3.4	
6	3.4	

$6\overline{)20.2}$ $3.37 \times .038 = .128$ Ft. Cd.

C167

#2909 Mon. May 19, 13.

Screen Section 24

Photo screen	Clark Standard
1	3.4
2	3.4
3	3.3
4	3.4
5	3.3
6	3.4

~~3.3~~ 6 | 20.5 → 3.37 × .038 = .128 Ft. Cd.

Screen Section 30

Photo screen	Clark Standard.
1	3.5
2	3.3
3	3.3
4	3.4
5	~~3.4~~
6	3.3

6 | 20.2 → 3.37 × .038 = .128 Ft Cd.

2909 Mon. May 19, 13.

Screen Section 38

Photo	Screen	Dark Standard
1	3.3	
2	3.2	
3	3.1	
4	3.1	
5	3.1	
6	3.2	

$6\overline{)19.0}$ $3.17 \times .038 = .120$ Ft cd.

Two machines equipped with arc lamps were set up side by side in the committee room and the pictures thrown simultaneously upon the screen were of equal size and kept in synco

2901 Mon. May 19, 13.

Test for Rudolf.

Large machine

Arc blown with magnet A.C.

Intensity of light reflected from screen

White cardboard — unglazed

30"x40"

54" distant from screen.

	Photo screen With magnet.	Cm.
1.	4.6	45
2.	5.0	50
3	5.2	47
4	5.0	46
5	5.2	48
6.	5.4.	50
7	5.0	6 | 28.6
	7 | 35.4	47.7
	5.06 ft candles.	

2.39 with reflecter
1.94 without "
.45

$\frac{.45}{1.94} \times 100 =$ 23.2% gain in illumination with reflecter o

2901

Test for Rudolf Tues May 20.
45 ampere.
Photo Screen 0.

With spherical Reflecter		Without Reflecter.	
2.1		1.5	
2.1		1.6	
2.4		2.1	
2.6		2.1	
2.6		2.2	
2.4	4 | 16.7	2.1	4 | 13.6
2.5	2.39	2.0	1.94

craters in front for above readings
carbons file here wider to bring craters in back.

1.7		1.0	
2.1		1.45	
2.0		1.8	
1.9		1.7	
2.0		1.85	
5	9.7	5	7.80
	1.94		1.56

1.94
1.56
.38

$\frac{.38 \times 100}{1.56} =$ 24.3% increase illumination with reflecter.

2909 Tues. May 20, 13.

Connected up ~~the~~ two Home P.K. machines, one with 30 C.P. 6 volt 6 amp lamp and the other with 110 volt incandescent lamp.

6 volt lamp.	27"×36" picture
110 volt lamp	54 × 72" aluminum
110 volt lamp	10ft regular picture screen.

Mr. Craft, ~~of~~ a foreign representative was pleased with the results.

Submitted report on new "B" condenser made by Bausch & Lomb.

Ordered necessary parts and started to assemble:

1. Home P.K. 6 V 6 amp incandescent lamp
2. " " 110 V 3 " 570 C.P. " "
3. " " Baby arc.
4. " " Special arc & Lamp house

C17N

Average Ft Candles with magnetic blower

5106 Ft Candles 47.7 amp.

Plain arc.

4.70 ft Candles 48.6 amp.

.36

$\frac{.36 \times 100}{4.70}$ = 7.66 % increase with blower

#2901 Wed. May 21, 1913

Test for Rudolf.
Plain arc in Kinetoscope.

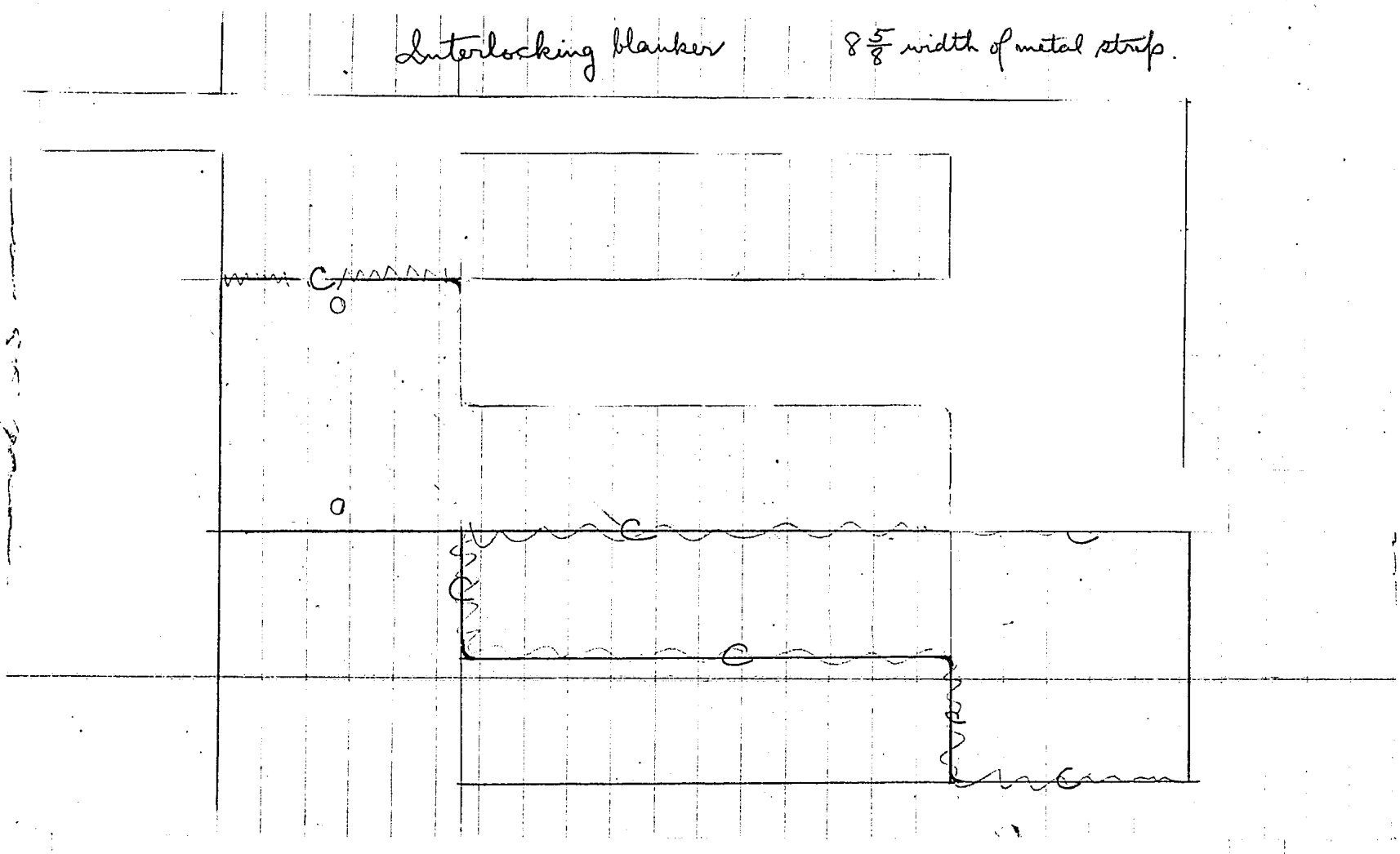
	Photo Ω area	Amp
1	4.5	48
2	4.8	52
3	4.7	48
4	4.6	48
5	4.9	49

5|23.5 4.70 ft candles. 5|24.3 4.86.

Inspected 6 "B" condensers taken at random from an order of 200. These were compared with the sample submitted. The 6 B&L. "B" condensers were all as good as sample. See my report May 21, 13.

I made a complete report to Mr. Hutch on the experiments with Frictional Microphone for Train Dispatching. May 21, 13

Thurs. May 22/73.

See New Book No 2.

[ITEM(S) FOUND IN BOOK]